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Time reversal violation in radiative beta decay: experimental progress[1] JOHN BEHR, TRIUMF, TINE VALENCIC, Caltech, JAMES MCNEIL, University of British Columbia, MELISSA ANHOLM, University of Manitoba, ALEXANDRE GORELOV, TRIUMF, DAN MELCONIAN, Texas AM University, GERALD GWINNER, University of Manitoba, DANNY ASHERY, Tel Aviv University — Once parity was discovered to be maximally violated in nuclear beta decay in the late 1950's, people immediately proposed many observables to see if time reversal symmetry was also broken. It was soon noticed that the presence of matter but no antimatter in the visible universe can't be accounted for with known physics, and extra sources of time-reversal (besides that found in meson-antimeson systems involving strange, bottom, and charm quarks) could provide a mechanism to generate it. A unique observable for our laser-cooled atom trap is to test for a finite correlation between three outgoing momenta. Any scalar triple product of momenta $\vec{p_1} \cdot \vec{p_2} \times \vec{p_3}$ flips sign with the sign of time: if its value does not average to zero, that indicates a violation of time-reversal symmetry. Since this scalar trivially vanishes from momentum conservation if there are only three momenta in the final state, to nontrivially test time-reversal symmetry we will measure the correlation $\vec{p_\beta} \cdot \vec{p_\nu} \times \vec{p_\gamma}$ in radiative beta decay. We will show test data from the β^- decay of ^{92}Rb, taken by adding simple γ detectors to the present TRIUMF neutral atom trap.

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